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TOY WATER GUN

TECHNICAL FIELD

This invention relates to toy water guns, and specifically to water guns having an expandable pressure tank.

BACKGROUND OF THE INVENTION

Water guns which eject a stream of water have been a very popular toy for children. These guns have been designed to eject the stream of water in a number of ways. The most common method of ejecting water has been by a manual pump coupled to the trigger of the gun. The pump is actuated by the mere pressure exerted by one finger of an operator upon the trigger, thus the pump typically cannot generate enough pressure to eject the water a lengthy distance. Additionally, these types of pumps work on the actuation of a compression piston which creates single, short bursts of water. However, many children desire the production of an extended stream of water.

Water guns have also been designed with small electric pumps which expel a stream of water from a tube coupled to the pump, as shown in U.S. Pat. Nos. 4,706,848 and 4,743,030. However, these small electric pumps typically cannot eject the stream of water a lengthy distance.

Toy water guns have also been developed which eject a stream of water by exerting pressure on the water within the gun greater than that of ambience and controlling the release of water through a control valve. The water is expelled from the gun due to this pressure difference. The pressurization of the water has been achieved in a variety of manners. U.S. Pat. No. 3,197,070 illustrates a water gun wherein pressure is applied to the water by collapsing a water storage area. Similarly, U.S. Pat. No. 4,854,480 illustrates a water gun wherein water is forced into an elastic bladder which expands to maintain the water under pressure.

Lastly, water guns have been designed with manual pumps which force water or air from a storage reservoir to a pressure reservoir, as shown in U.S. Pat. No. 5,150,819. The conveyance of the water or air into the pressure tank compresses the air therein, thereby exerting pressure on the water within the storage tank. However, as water is released from the pressure tank the volume occupied by the air increases. This increase in volume causes the air pressure within the pressure tank to decrease rapidly, thus resulting in a decrease in water pressure and a weaker projected water stream. Another potential problem associated with this type of water gun is that since the pressure tank is typically constructed of a hard plastic, the accidental striking of the pressure tank may cause it to crack or rupture. This problem is even more likely to occur when the interior of the plastic pressure tank is stressed under high pressure.

Accordingly, it is seen that a need remains for a water gun which can generate a long, steady stream of water and which is not easily ruptured. It is to the provision of such therefore that the present invention is primarily directed.

SUMMARY OF THE INVENTION

In a preferred form of the invention a water gun comprises a housing, a storage reservoir adapted to hold liquid and an expandable pressure tank adapted to hold liquid and to expand upon depositing liquid therein so as to exert a force upon the liquid. The water gun also has a pump for drawing liquid from the storage reservoir and depositing the drawn liquid into the expandable pressure tank. Conduit means are

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included for conveying liquid from the expandable pressure tank to ambience and control means for controlling the flow of liquid therethrough.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a water gun embodying principles of the invention in a preferred form.

FIG. 2 is a side view, shown in partial cross-section, of the water gun of FIG. 1.

FIG. 3 is a cross-sectional view of an alternative embodiment of the expandable pressure tank of the water gun shown in FIG. 1.

DETAILED DESCRIPTION

With reference next to the drawings, there is shown a water gun 10 having a housing 11 in the shape of a gun with a barrel 13, a handle 14 and a stock 15. The gun 10 has a trigger 17, a removable liquid storage tank or reservoir 18 coupled to the stock 15, an expandable or resilient liquid pressure reservoir or tank 19 mounted to the stock, and a conventional nozzle 21 mounted to the end of the barrel 13. The storage tank 18 has a threaded neck 23 threadably mounted within a threaded receptor 24 within the housing and an opening or port 22 in which is removably mounted a filling cap 25. The receptor 24 has a spring biased check valve or vent 26 which allows air to enter storage tank 18. The pressure tank 19 has a plastic outer shell 29 and an elastic, expandable inner bladder 30 mounted within the outer shell 29 in fluid communication with the storage tank 18. The bladder is preferably made of an elastic material such as rubber. The bladder is shown in phantom lines in FIGS. 1 and 2 in an unpressurized, unexpanded, relaxed configuration and in FIG. 2 in a pressurized, expanded, tensioned configuration in solid lines.

As shown in FIG. 2, the gun 10 has a liquid pump 32 having a handle 33 slidably mounted to barrel 13. The handle 33 is coupled to a piston 34 slidably mounted within a cylinder 35. The cylinder 35 and piston 34 define a chamber 38. A flexible intake tube 36 extends from storage tank 18 to an inlet of pump 32. A flexible outlet tube 37 extends from an outlet of pump 32 to a T-shaped connection 40. A tube 41 extends from the T-shaped connection 40 to pressure tank 19. Intake tube 36 is coupled to a check valve 43 which restricts the flow of liquid to storage tank 18. Similarly, outlet tube 37 is coupled to a check valve 44 which restricts the flow of liquid to pump 32. A flexible delivery tube 45 extends from the T-shaped connection 40 to nozzle 21. A pivotable trigger pinch bar 47 is coupled to trigger 17 and a spring 48. The spring 48 biases pinch bar 47 against delivery tube 45. A stop 49 is positioned against delivery tube 45 opposite pinch bar 47.

In use, the liquid storage tank 18 is filled with a liquid, hereinafter referred specifically to as water W, either by removing it from the stock 15 and filling it through neck 23 or by removing filling cap 25 and pouring water into the tank through opening 22. Should the storage tank be removed for filling it is subsequently threadably remounted to the stock.

The pump handle 33 is then reciprocally moved so as to actuate piston 34 through cylinder 35. The movement of the piston 34 within the cylinder 35 has two-cycle strokes, a priming stroke where water is drawn forth from the storage tank 18, and a compression stroke wherein water is displaced by the piston 34. The priming stroke starts when the piston 34 is retreated within its cylinder 35 to create an elongated volume chamber 38. The vacuum created by the